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The Ammonit Data Logger Series 32

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Before delivery to our customers, every Ammonit Data Logger goes through a rigorous testing programme at temperatures ranging from -30℃ to +60℃. The logger you receive has already proved it can cope with the worst of operating conditions...

Ammonit offers reliable, userfriendly measuring equipment for all essential climate data. The focus is primarily on environmental protection and regenerative energy technologies. The new Data Loggers of the "Series 32" offer much more than earlier models - including direct connections for ultrasonic sensors.

All measuring stations are designed for long-term autonomous operation, and are able to withstand weather influences such as extreme temperature fluctuations and high humidity. The low power consumption of the Data Logger and the selected sensors make it possible to operate without any main power supply, using batteries or solar panels. The wide range of accessories make it possible to provide simple system solutions, even for very difficult locations.

All Ammonit measuring systems are enclosed in IP65 protective housings, and bear the CE-mark of the European Commission. As an extra precaution, the Data Logger should be installed in a lockable and well earthed metal cabinet, which not only provides better protection against weather and lightning, but also protects against theft and vandalism. Ammonit has developed strong steel cabinets for this purpose which are also able to house additional components. As well as providing ideal protection they ensure easy installation of the equipment on site.

The Data Loggers of the "Series 32" are flexible and can be used for a wide range of applications. The measurement processing and data reliability meet the requirements of professional experts, but at the same time they are so simple, that even beginners can use the Data Logger successfully. The WICOM-32, METEO-32 and METEO-32X loggers only differ in the number of input channels they have.

In addition to storing measurements and statistics, Ammonit Data Loggers also have a **Slow Motion Recorder [SMR]**.

Overview of the data loggers			
	WICOM-32	**METEO-32**	**METEO-32X**
Anemometer	**3**	**3**	**3**
Wind Vanes	**2**	**2**	**2**
Hygrometer		**1**	**1**
Thermometer		**1**	**1**
Barometer		**1**	**1**
Pyranometer		**1**	**1**
Rain Gauge		**1**	**1**
12-bit-ADC			**4**
16-bit-Counter			**2**
Status			**2**

WICOM-32
The wind computer WICOM-32 is a data logger developed specially for wind energy applications. It registers the wind speed at three heights and the wind direction at two heights - essential for the precise investigation of a potential site and for energy predictions.

METEO-32
The METEO-32 data logger is a further development of the WICOM-32. It registers all relevant data for detailed weather observations: Wind speed (at 3 heights), wind direction (at 2 heights), as well as temperature, relative humidity, atmospheric pressure, solar radiation and precipitation.

METEO-32X

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The METEO-32X data logger is developed for meteorological measurements. It registers all the relevant data needed for detailed weather observations: Wind speeds (at 3 heights), wind direction (at 2 heights), as well as temperature, relative humidity, atmospheric pressure, solar radiation and precipitation, and offers eight additional free channels for other applications.

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Data storage

The available memory of the Data Loggers is divided into:

Measurement series memory,
Wind statistics memory and
Slow Motion Recorder [SMR]

The data sets for the measurements and wind statistics are structured in blocks. One block in the measurement series memory, for example, contains all the values for one day in sequence. Both individual memories are organised as ring memories. When the memory is full, the oldest block is then written over. This means that datasets remain in the memory even after they have been read out, and can be accessed again as required. Data is only deleted when space is required in the memory for the current measurements. Successive read-outs overlap and so the data can easily be analysed without any gaps.

Ring memory

All Ammonit Data Loggers have a non-volatile 4 MB ring memory. This means:

No loss of data in the event of a power loss

Memory for 500 000 measurements

No need to bother with deleting data to free up memory

Measurement series

The Data Logger produces measurement series by registering the readings for the individual parameters at selected intervals ranging from 1 second to 1 day. If required, mean values, maxima and minima and also standard deviations can be registered. The dataset for one day is collected in a block, which can be read out individually. The measurement series can transferred to a PC via a serial interface in the form of a text file, which means that they can easily be edited and processed using standard software (e.g. MS Excel, etc.).

Internal Clock

Without a precise clock, accurate registration of date series is not possible. But electronic clocks are temperature-dependent. At -20°C the deviation is already 75ppm, or 3 minutes per month.

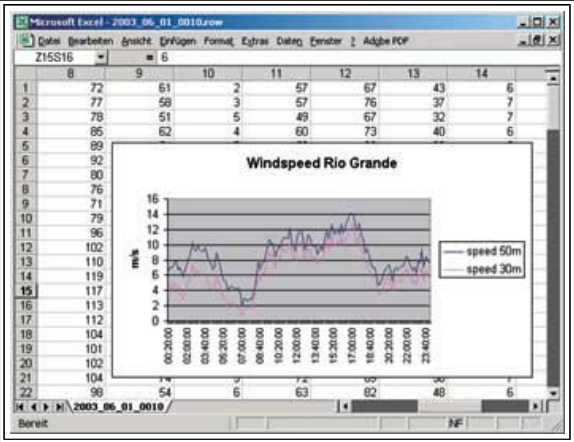
Ammonit is not satisfied with simple quartz timers. Using a system that we call "gentle time control", Ammonit Data Loggers now operate with an accuracy of < 25ppm over the temperature range from -30°C to +60°C.

Wind statistics for energy predictions

Input parameters such as wind speed and wind directions are very dynamic. They can change in characteristic ways in the short term ("gusting"), as well as over very long periods (e.g. seasonal changes). A series of standard methods have been developed for wind energy users to characterise local wind regimes with only a few statistical values and tables.

The frequency distribution of wind speed is produced for two anemometers with 29 classes x 1 m/s, allowing even locations with strong winds to be analysed fully.

The wind rose shows the distribution of the direction of the wind in 36 sectors, allowing a detailed investigation of energy distribution, which is essential when planning a wind farm.



Graphic presentation of a measurement series (at 30m and 18m) with MS Excel.

Slow Motion Recorder [SMR]

The Ammonit Data Loggers can also be used to record wind data in detail over a specified period. Following a programmed event, for example a wind speed measurement that exceeds a pre-determined threshold value, the data registered at the measurement intervals from the wind input goes directly to a separate memory. A total of 180 measurement lines can be recorded. This is equivalent to a total period of 3 minutes for a 1 second measurement interval, and at lower frequencies a correspondingly longer period will be covered.

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Statistics for energy predictions

The basis for the prediction of wind energy yields is the determination of the longterm relative frequency distribution of the wind speed at the height of the hub of the wind turbine. It can be represented by

The Rayleigh Function

If only the mean value of the wind speed is known for a location, then this function can be used to calculate the probable variations around this value. However, the Rayleigh distribution has a fixed form and

Statistics

provide a quick overview of relevant wind energy data, without the need for expensive software. Ammonit statistics are compatible among others with “ALWIN” evaluation software.

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ın only allow for the regional variations of a site to a limited extent.

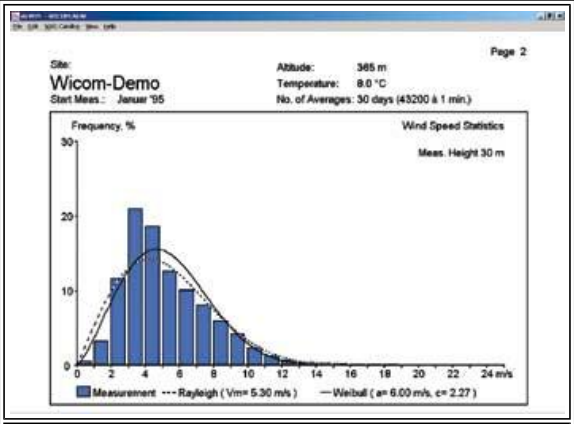
Free download **here**

The Weibull function

In order to calculate the Weibull distribution, two parameters are required: The scaling factor A and the form parameter C. This function describes the wind situation more accurately than the Rayleigh Function, because the shape of the distribution can be taken into account.

Classification of measurement data

This method is used to bring measurement data into a standard form reduced to the necessary minimum.



The chart shows an example of the frequency distribution of wind speed produced using "ALWIN" evaluation freeware.

The measured data has to be corrected in two stages:

Conversion to hub height

Since the wind measurements are invariably measured at heights much lower than that of the hub of the wind generator, it is necessary to convert the values to the necessary height. To do this, the first step is to determine the roughness length at the location, where necessary allowing for the differences in the terrain in various directions. Tables are available for the roughness length which provide approximate guideline values on the basis of descriptions of the terrain. However, it is better to conduct careful measurements of the wind speeds at two heights. The roughness length represents the height at which the wind speed is slowed down to zero by the nature of terrain.

Comparisons with long-term data

Data must be recorded for at least one complete year, in order to take seasonal variations into account. This data covering one year must then always be compared with long-term data, because the wind speed for a year can vary by up to 20 % from the long-term mean. These comparative datasets which are needed for the corrections can often be obtained from weather stations in the neighbourhood, from airports, or from wind generators already installed in the area. The key is the continuity of measurements (e.g. no discontinuities due to moving the mast) and the similarity of the topography in the locations.

Roughness length in metres	Type of terrain
0.4	Built-up areas with trees and numerous hedges
0.1	Farm land with some buildings and high wind-breaks
0.03	Open ground with individual, widely spaced obstacles
0.001	Surface waters, flat, open ground (e.g. airport runways, mown fields, etc.)

Definitions based on the European Wind Atlas.

The roughness length represents the height at which the wind speed is slowed down to zero by the nature of terrain.

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The standards of the "Series-32":

1. Recording measurement series at freely programmable intervals
2. Producing wind statistics for energy predictions
3. Slow-motion Recording (SMR) of wind data for special events
4. Three buttons and a two-line display for easy use
5. Designed for use over a temperature range from -40°C to +85°C
6. Low-Power electronics and standby-operation
7. Internal clock accurate to < 25 ppm over the entire temperature range (max. deviation approx. 1 minute / month)
8. Powered by standard 9V block battery, lithium type optional
9. Socket for external power supply 10-26 V DC

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10. Separate power supply for wind sensors with trip switch
11. GSM-option for data transfer and e-mail / SMS
12. Remote control and data transmission through the World Wide Web
13. Internal monitor of power source and internal temperature
14. Plausibility control of measurement values
15. Generation of warnings (GSM-option)
16. 1000 KB memory (approx. 500 000 measurements)
17. Update of user software via serial interface and GSM
18. RS232-interface for data transfer (38400 baud)
19. Data compression to accelerate data transfer up to 30%
20. RS485-interface, e.g. for connecting ultrasonic anemometers
21. User friendly software for Multi-Logger-Management with graphical user interface

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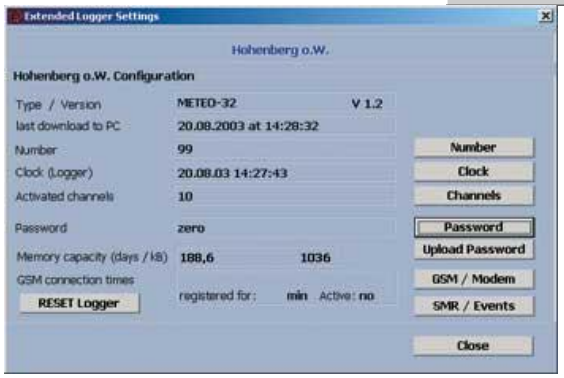
Software CALLaLOG2002

The "CALLaLOG2002" program can be used to configure, monitor and control the data transfer of any number of measuring stations via modem or cable. A number of loggers can be grouped in individual projects, each with their own interface and a separate access time. In this way, all the projects, with any number of measuring systems can be monitored quickly and efficiently.



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Technical Data

Data Logger Series 32			

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	P2500 WICOM-32	**P2510 METEO-32**	**P2520 METEO-32X**
Input channels	3 x Wind speed 2 x Wind direction	3 x Wind speed 2 x Wind direction 1 x Rel. air humidity 1 x Air temperature 1 x Air pressure 1 x Global radiation 1 x Rain	3 x Wind speed 2 x Wind direction 1 x Rel. air humidity 1 x Air temperature 1 x Air pressure 1 x Global radiation 1 x Rain 4 x 12-bit-ADC 2 x 16-bit Counter 2 x Status
Housing - Protection - Dimensions - Weight - Connectors	IP65, connectors IP67 (closed) 120mm x 200mm x 75mm approx. 1.2 kg (incl. batteries) screwed miniature round-socket, Binder series 723		
Power Supply - Operation: - External - Current	2 alkaline batteries (9V E-Block - 6LR61 - PP3), optional lithium batteries input 12 VDC 10...24 Volt (connector supplied) approx.: 0,5 mA (between the measurements), 45 mA (measuring)		
Temperature - Operation - Display readable	- 40°C ... + 85°C - 10°C ... + 50°C Before being delivered to the customer, each appliance must pass a 24-hour test at temperatures from -30° to +60°C		
Memory	1000 KByte non-volatile-memory (EEPROM) recorded 500.000 values.		
Clock Backup battery	Buffered real time clock, error at -30°C ... +60°C: < 25ppm 3V lithium button cells CR2032, approx. 180...230mAh		
Digital output	Open-Drain, 12 ... 24VDC, approx. 20mA, e.g. can switch on or off a sensor heating via relay (also via SMS)		
Data output	Display: 2 x 16 character double spaced, RS232 serial: 38.400 baud, E71 ASCII		
Series measurements - Scan interval - Log interval - Configuration - Functions	1 ... 60 seconds 1 ... 9999 scan intervals Ring memory, subdivided in daily data blocks Average, maximum, minimum, standard deviation		
Statistics - Scan interval - Log interval - Configuration - Evaluation	1 minute Monthly according to real time calendar Shift register, subdivided in 4 statistic blocks 29 classes ±1 m/s wind speed distribution (in 2 heights) 36 sector wind rose with unique distributions (anemometer 1)		
SMR - Scan interval - Memory capacity - Configuration	1 ... 60 seconds 180 Measurement lines separatel non-volatile memory		
Included delivery	User's manual, Batteries, Drying agent, PC-cable, 3 pin plug (ext. supply), CALLaLOG2002 Software.		
Recomended sensors - Wind speed - Wind direction - Temperature - Temp./ Humidity - Air pressure - Precipitation	P6100(H), P6171, P6140, P6160 (mit Adapter P9112) P6200(H),P6230 (H),P6240,P6245	P6100(H), P6171, P6140, P6160 (mit Adapter P9112) P6200(H), P6230(H), P6240, P6245 P6471 P6831 P6520, P6542 P6720, P6721	

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